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COST DATA - VAPOR RECOVERY SYSTEMS AT SERVICE STATIONS

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Environmental Protection Agency

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16. ABSTRACT

Data are presented on the costs of installing vapor control systems at gasoline service stations. Data were obtained on a voluntary basis from contractors, purchasers of systems, governmental agencies, and an engineering design firm.

The control systems are divided into two types (1) vapor balance systems and (2) vacuum assist systems with vapor processing units. A further breakdown was made by number of dispensing nozzles.

In general the costs of vacuum assist systems appear to be approximately twice those for vapor balance systems.

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Contract No. 68-02-1405
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COST DATA - VAPOR RECOVERY SYSTEMS AT SERVICE STATIONS

SUMMARY

As part of Task Order No. 2, Contract No. 68-02-1405, Pacific Environmental Services, Inc. (PES) conducted a survey of costs associated with the installations of vapor recovery systems at service stations. Data were obtained on a voluntary basis from contractors, purchasers of systems, governmental agencies, and an engineering design firm.

Systems included in the survey covered a broad range of service stations ranging from small captive facilities, through regular retail locations, to very large PX facilities on military bases. In the case of vacuum assist recovery systems, vapor processing units from all four of the current principal suppliers of such equipment were covered.

Cost data are provided for each source of information. The detail of these data vary widely ranging from two categories - (1) cost of unit, and (2) installation to as many as 12 categories of costs. The data are summarized according to basic type - (1) vacuum assist, and (2) vapor balance, with a further breakdown by number of pumps.

For each major category of recovery system, there was found to be a fairly wide spread of costs within each station size grouping. Notwithstanding this spread, a consistent increase in costs with size was noted. In part, these cost variations within similar size ranges result from site differences such as length of piping runs required and soil type and in part to lack of uniformity in cost elements included in the estimates.

In general the costs of vacuum assist systems appears to be approximately twice those for vapor balance systems.

DISCUSSION

The initial effort in the collection of cost data was to make direct inquiries of station operators or managers either to obtain the information directly or to determine an alternate source of information. Some data were obtained in this manner but figures were largely quoted verbally from memory and were thought not to be too accurate. Subsequently inquiries were made to a number of other sources of cost data. These included installation contractors, San Diego County Air Pollution Control District, San Diego County Assessor, a design engineering firm, and several purchasers of equipment such as convenience food chains, department stores, major oil companies, and the U.S. Navy.

Most of the data obtained covered specific locations, although some average cost information was supplied by contractors. In one case, costs supplied on vapor balance systems were averaged over 33 actual installations. Data supplied by Mr. H. Ernest Schnepf, Valuation Estimator, San Diego County Assessor, deserves special attention. First, they have legal standing to obtain information, secondly they are interested only in value added, not in total costs. Therefore, such items as concrete breakout and resurfacing would not be included for assessment purposes. However, total costs were obtained during a survey conducted by them. Although information on individual sources cannot be disclosed by the Assessor because of confidentiality restrictions, Mr. Schnepf did state that their information indicated that typical vacuum assist system costs were approximately double those for balance systems.

Detail on costs varied widely with the least amount of information being supplied on small captive units. In some cases only two categories (1) installation and (2) equipment were supplied while in the case of systems supplied to the U.S. Navy, twelve sub-categories of costs were supplied. We have prepared a list of possible cost categories which might be considered for use in any future work. This list follows:

Architectural and Engineering Services

Design and drafting

Inspection

Testing

Instruction

Service Manuals

Permit Fees

Site Work

Earthwork (saw cutting, trenching, backfill, compacting, asphalt patching)

Piping

Electrical

Painting

Concrete Work

Installation (vapor recovery unit, blowers, ITT valves, PV vent etc.)

Security enclosures

Miscellaneous (temporary barricades, cleanup, insurance, security)

Equipment

Vapor Recovery Unit (delivered at site)

Nozzles and hoses

Swivels

Regulating valves (e.g. ITT)

Flame arrestors

Blowers

Return adapters and caps

Manhole frames and covers

Fill pipe adapters

PV vent

There are a number of location and size factors which can affect the cost of either a vapor balance or a vacuum assist recovery system. These include physical size of site, separation of pump islands, distance to vapor recovery unit location, amount of concrete removal, length of trenching, type of soil, and location problems (such as necessity for roof location of vapor recovery equipment). Size factors relate to number of pumps, whether double pumps are used, and design gallonage volume. In case of the latter, short term (e.g. 1 hour) rates are more relevant than monthly rates. There is some variation in cost as a function of the type of vapor recovery unit selected (in the case of vacuum assist systems). There can be indirect effects of the latter on piping and electrical costs.

Cost data is presented in the sections following. The first section is a tabular listing of costs obtained for individual service station locations. No data is included for military installations because of the substantially greater amount of detail available for these locations. The second section contains estimates made by various sources as to the costs associated with secondary systems according to number of pumps at the station. The third section is similar to Section II except that the estimates are for vapor balance systems. The fourth section covers bid costs and estimates made for various locations at U.S. Naval and Marine Corps facilities.

The data presented here range from informed estimates of to actual costs. They cover a time period of construction from 1971 to the present. It is also obvious that some variation in practices of reporting costs exists and that different construction standards probably have been used. These differences seem to be especially pronounced when a comparison between civil and military costs is made.

COST DATA - SPECIFIC LOCATIONS
VACUUM ASSIST

Name and Location	Source of Information	Make of Unit	Size and Throughput	COSTS Vapor Recovery Unit	Nozzles	Installation	Total	Notes
1. GEMCO 30th & Highland, Nat. City	Stan Hatfield DAGAS CORP.	Intermark	16 nozzles 212,500 gal/mo.	$6,500	-	$10,000	$16,500	
2. DOORMANS San Diego	Paul Nachant (Contractor)	Environics Vapox A 1500	1 nozzle	2,000	$ 175	4,295	6,470	
3. UNION OIL CO. Waring & Zion, San Diego	Paul Nachant (Contractor)	Process Products	6 nozzles 25,100 gal/mo.	3,750	660	4,300	8,710	
4. FEDCO 54th & Euclid San Diego	Paul Nachant (Contractor)	Process Products	12 nozzles	6,200	1,320	6,250	13,770	
5. TWO GUYS No. 4th St. Chula Vista	Paul Nachant (Contractor)	Intermark	12 nozzles	5,900	660	7,100	13,660	
6. PEPSI COLA Mission Valley	Petroleum Contractors (Contractor)	Environics	2 nozzles	4,295	350	2,200	6,845	
7. COCA COLA I 15 & Hwy 94, San Diego	Petroleum Contractors	Environics	2 nozzles	4,295	350	2,150	6,795	
8. PHILS CAVALIER CAR WASH Othello Ave., San Diego	Petroleum Contractors	Environics	12 nozzles	4,295	2,220	4,200	10,715	
9. STANDARD OIL 10587 Tierra San Diego	C.R. Lupcho	Clean Air	6 nozzles	5,788	-	13,047	18,835	Nozzles, hoses & ITT valves supplied by Standard Oil
10. STANDARD OIL Friars & Frazee	C.R. Lupcho	Process Products	10 nozzles 36,000 gal/mo.	5,722	1,325	9,868	16,762	

COST DATA - SPECIFIC LOCATIONS (continued)
VACUUM ASSIST

Name and Location	Source of Information	Make of Unit	Size and Throughput	Vapor Recovery Unit	COSTS Nozzles	Installation	Total	Notes
11. STANDARD OIL CO. Clairmont & Clairmont Mesa Blvd.	C.R. Lupcho Standard Oil	Process Products	9 nozzles 44,700 gal/mo.	$5,810	$1,192	$7,316	$14,318	
			BALANCE SYSTEMS					
1. STANDARD OIL CO. Baltimore Dr. & Lake Murray San Diego	C.R. Lupcho Standard Oil	-	10 nozzles 44,600 gal/mo.	-	1,325	6,954	8,279	
2. GULF OIL CO.	Paul Nachant	-	6 nozzles 53,000 gal/mo.	-	774	5,800	6,574	

II. ESTIMATES OF AVERAGE COSTS OF VACUUM ASSIST SYSTEMS BY SOURCE OF INFORMATION

SOURCE - DISTRICT LETTER TO WESTERN SERVICES
CONFIRMING ESTIMATES DATED JUNE 30, 1975

No. Pumps / Item	2	6	10
Installation	$2,000	$3,500	$5,000
Electrical	5,100	500	500
Nozzle Kits	600	1,800	3,000
Unit (Avg)*	3,000	4,000	5,000
Total	$6,100	$9,800	$13,500

*Average Unit Cost comes from SDAPCD Report

SOURCE - LARRY LUHNOW - SOUTHLAND CORPORATION
FROM TELEPHONE CONVERSATION (714) 465-2101
7/17/75

No. Pumps / Item	2
Installation	$3,400
Unit	2,889
Accessories	344
Total	$6,633

SOURCE J.F. KEAVENY - MR. PAUL ARIANIS
FROM TELEPHONE CONVERSATION (714) 262-8611
8/12/75

No. Pumps / Item	2	4
Unit	$2,970	$2,970
Installation (For 134' of trenching, saw cutting, asphalt patching, etc.	4,000	4,000
Electrical	400	400
Nozzles	170 (85 ea)	340 (85 ea)
ITT Valves	100 (50 ea)	200 (50 ea)
ITT Valves Inst.	200 (100 ea)	400 (100 ea)
Flame Arrest	20 (10 ea)	40 (10 ea)
Swivels	26 (13 ea)	52 (13 ea)
Return Hoses	30 (15 ea)	60 (15 ea)
Enclosure	$280-$850	$280-$850
Total	$8,196-$8,766	$8742-$9,312

SOURCE - RAY WEEKS - SAN DIEGO COUNTY
FROM REPORT DATED JULY 7, 1975

No. Pumps / Item	6
Installation	$5,041
Unit	4,600
Total	$9,641

SOURCE - BOB HARRINGTON - FRED FIEDLER & ASSOCIATES
FROM TELEPHONE CONVERSATION (213) 381-7891
8/13/75

No Pumps / Item	6
Installation	$3,500
Earth work	1,500
Electrical	1,000
Equipment and on site inst.	4,000
Nozzles & Hoses	1,320
Total	$11,320

SOURCE - JOHN E. CYRUS CO. - MR. JERRY ERBER
TELEPHONE CONVERSATION (714) 297-4113
8/12/75

No Pumps / Item	2	4	6
Installation			
Labor		$2,345	$3,394
Material		1,256	1,538
Electrical		450	450
Nozzles		($125 ea) 500	750
ITT Valve		(50 ea) 200	300
ITT Valve Inst.		(100 ea) 400	600
Material (Hoses, Swivels, F.A.)		(35 ea) 140	210
Unit (Avg)		3,000	3,000
Enclosures		$350-$1,000	$350-$1,000
Total	$7,000*	$8,651-$9,291	$10,592-$11,242

*1974 price all others 1975 prices

SUMMARY - VACUUM ASSIST SYSTEMS

Item \ No. Pumps	1-4	6	8-10	12+
Installation				
Range	$2,000-$4,850	$3,500-$13,047	$5,000-$9868	$4,295-$10,000
Avg.	$3,277	$6,327	$7,395	$6,848
Electrical				
Range	$400-$500	$450-$1000		
Avg.	$438	$650	$500	
Nozzles				
Range	$175-$1,240	$660-$1,800	$1,192-$3,000	$1,320-$2,220
Avg.	$587	$1,132	$1,839	$1,770
Unit				
Range	$2,889-$4,295	$3,000-$5,788	$5,000-$5,810	$4,200-$6,500
Avg.	$3,464	$4,190	$5,511	$5,633
Total Cost				
Range	$6,100-$9,312	$8,710-$18,835	$13,500-$16,762	$10,715-$16,500
Avg.	$7,733	$11,591	$14,860	$13,662

III. ESTIMATES OF AVERAGE COSTS OF BALANCE SYSTEMS DATA BY SOURCE OF INFORMATION

ESTIMATES OF AVERAGE COSTS
VAPOR BALANCE SYSTEMS

Source of Data	No. Pumps	Cost Data		
		Nozzles and Hoses	Installation	Total
1. Mr. Pacheco Gulf Oil Co. Tel.Con. 7/14/75	9-12	-	-	$6,000
2. San Diego Co. APCD Letter (6/30/75) to Western Svcs. Confirming estimates provided to County	2	400	$2,500	2,900
"	6	1,200	4,000	5,200
"	10	2,000	5,500	7,500
3. San Diego Co. APCD Report by Ray Weeks, dated 7/7/75	6	-	-	5,041
4. Nachant Construction Tel.Con. 7/31/75	6	774	$4,150-$5,800	4,924-6,574
"	9	1,161	4,225	5,386

SUMMARY - BALANCE SYSTEMS

Item \ No. Pumps	2	6	9-12
Installation			
Range		$4,000-$5,800	$4,225-$6,954
Avg.	$2,500	$4,710	5,560
Nozzles			
Range		$774-$1,200	$1,161-$2,000
Avg.	$400	$966	$1,495
Total Cost			
Range		$4,924-$6,574	$5,386-$8,279
Avg.	$2,900	$5,435	$6,791

IV. COSTS OF VAPOR RECOVERY SYSTEMS AT UNITED STATES NAVAL AND MARINE CORPS FACILITIES

A. VAPOR RECOVERY SYSTEMS AT NAVY, MARINE CORPS EXCHANGE SERVICE STATIONS AND FUEL FARM AND TRANSFER FACILITIES - SAN DIEGO BAY AREA, CALIFORNIA

1. Source of Information - Letter dated July 9, 1975 from Resident Officer in Charge of Construction San Diego Area and Cost Breakdown sheet for Contract N62474-74-C-4024. Letter signed by Robert M. Manuel, Supv. Civil Engr.

2. Facilities Covered

Location	Type Facility	No. Pumps	Throughput (gal/mo)
Nav. Air Sta. Imp. Beach	Svc. Sta.	6 dual	350,000
Nav. Air Sta. Imp. Beach	Svc. Sta.	1 single	18,000
Nav. Air Sta. Miramar	Svc. Sta.	6 dual	667,000
Nav. Air Sta. Miramar	Svc. Sta.	8 dual	300,000
Nav. Air Sta. Miramar	Fuel Transfer Facility	-	50,000
Nav. Amphib. Base Coronado	Svc. Sta.	8 dual	200,000
Nav. Air Sta. No. Island	Svc. Sta.	10 dual	400,000
MCRD San Diego	Svc. Sta.	12 dual	300,000
Nav. Sta. San Diego	Svc. Sta.	8 dual	535,000
Nav. Sta. San Diego	Svc. Sta.	8 dual	400,000
Nav. Tng. Cntr.	Svc. Sta.	9 dual	650,000
Nav. Sub. Sup. Facil.	Svc. Sta.	4 dual	80,000

3. Cost Data - The successful bid was made by the Fritz A. Nachant, Inc. Construction firm. The bid price covered all facilities so that costs for any one installation cannot be determined from the information supplied. Overall cost data is shown below for the twelve facilities involved:

		Quantities		Material Cost		Labor Cost		
Item No.	Description of Item	No. of Units	Unit	Unit Cost	Cost	Unit Cost	Cost	Total Cost
1.	Vapor Collection & Gas Mfg.	14	1	19500.	273,000.			$273,000.
2.	Excavation	4200	LF			10.00	42,000.	42,000.
3.	Piping	9500	LF	2.00	19,000.	7.34	69,730.	88,730.
4.	Electrical	4800	LF	2.00	9,600.	3.00	14,400	24,000.
5.	Backfill & Compact	4200	LF	1.00	4,200.	2.00	8,400.	12,600.
6.	Concrete Patch	5000	sqft	.20	1,000.	.80	4,000.	5,000.
7.	AC Patch	5000	sqft	.10	500.	.50	2,500.	3,000.
8.	Bumper Posts	55	1	5.82	320.	13.00	715.	1,035.
					307,620		141,745	$449,365.00

Even though there are twelve facilities listed the bid breakdown shows fourteen vapor recovery units. Information from Process Products, Inc. is that only twelve special units are being supplied. Assuming the latter information to be correct, the average cost for the twelve installations is $37,447.

B. ENGINEERING ESTIMATES BY THE FRED FIEDLER AND ASSOCIATES COMPANY

Fred Fiedler and Associates is an architectural and engineering firm who supply design services to the U.S. Navy under contract. Recently cost estimates were made for vapor recovery systems to be installed at five Navy and Marine Corps service stations in Los Angeles and Orange Counties. The number of hoses at each station is known but gasoline throughput data are not given.

The cost estimates supplied have been summarized by location and by expense category. The first tabulation gives the station location, number of nozzles and estimated material, labor and total costs. The second tabulation breaks down the total cost for all five locations into a number of expense categories: These listings follow:

VAPOR RECOVERY SYSTEMS

NAVY AND MARINE CORPS SERVICE STATIONS

A. COSTS BY LOCATION

Location	No Nozzles	Cost Estimates Material	Labor	Total
Bldg. 212 NAS Los Alamitos	1	$8,173	$7,682	$15,855
Bldg. 244 NAS Los Alamitos	20	31,402	17,010	48,412
Bldg. 228 NWS Seal Beach	2	9,079	9,695	18,774
Bldg. 27 NWS Seal Beach	6	11,213	9,845	21,058
Bldg. H-91 Camp Pendleton	2	9,466	8,831	18,207

B. COSTS BY EXPENSE CATEGORY

Category	Costs Material	Labor	Total
General Requirements	$2,824	$5,550	$8,374
Earthwork and Asphalt Paving	1,697	8,764	10,461
Concrete	2,540	6,040	8,580
Painting	100	1,000	1,100
Mechanical	7,705	18,815	26,520
Electrical	2,492	5,974	8,466
Equipment			
Vapor Recovery Unit	37,500	1,700	39,200
Hoses & Nozzles	5,890	930	6,820
Other - Proportioning Valves, flame arrestors, manhole covers, P-V vent	5,585	4,290	12,875
Equipment Total	51,975	6,920	58,895
Total	$69,333	$53,063	$122,396